Appendix B

Water Quality Assessment

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Public Access to Shoreline Recreational Fishing in Narragansett Bay

Evaluation of Alternative Sites for Fishing Access

Appendix B:
Water Quality Assessment

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Introduction:

To further assess the quality of fishing experience at the alternative fishing access sites, the water quality throughout Narragansett Bay, and within the immediate vicinity of the alternative sites, was evaluated. Data for this evaluation were principally derived from the State of Rhode Island and Providence Plantations, 2002 Section 305(b) *State of the State's Waters Report* (RIDEM 2002). The State of the State's Waters report summarizes water quality data from a variety of sources and develops a water quality assessment and determination of water quality use support status for the waterbodies of Narragansett Bay. Additional data were also provided by the State of Rhode Island *Water Regulations, Appendix A: Water Quality Classification Descriptions* (RIDEM 1997); and *Narragansett Bay Water Quality: Status and Trends* 2000 (RIDEM 2000).

Several parameters considered indicative of overall water quality were compared and contrasted among waterbodies associated with the various alternative access sites (Table 1). Water quality parameters evaluated, with a brief summary of each, include:

Aquatic Life Support – Where appropriate data were available, the *State of the State's Waters Report* evaluated use support status for aquatic life according to the following criteria: the waterbody provides suitable habitat and water quality for survival and reproduction of desirable macroinvertebrates and supports a healthy macroinvertebrate community. Based on these criteria, aquatic life support was classified as:

> Fully supporting - water quality meets designated use criteria.
> Partially supporting - water quality fails to meet designated use criteria at times
> Not supporting - water quality frequently fails to meet designated use criteria
> Not assessed (n.a.) – no determination was made in the *State of the State's Waters Report* due to lack of appropriate data for the given waterbody.

Impairment Causes – The *State of the State's Waters Report* identified pollutants or other stressors that contributed to the actual or threatened impairment of designated uses in a waterbody. Impairment causes in waterbodies under consideration in the present study included: low dissolved oxygen concentration, excessive algal growth, bacterial and viral pathogens, nutrient enrichment, metals, total toxics, and biodiversity impacts.

Water Class – Water classifications are assigned by the State of Rhode Island and denote the water quality "goals" for a waterbody, not the present condition (RIDEM 1997). The classifications thus indicate implicit water quality impacts from certain uses such as wastewater treatment outfalls, combined sewer overflows, mooring fields, etc. The water use classifications for marine and estuarine waters are as follows:

> Class SA – These waters are designated for shellfish harvesting for direct human consumption; primary and secondary contact recreational activities, and fish and wildlife habitat. They shall be suitable for aquaculture uses, navigation, and industrial cooling. These waters shall have good aesthetic value.

Class SB - These waters are designated for primary and secondary contact recreational activities; shellfish harvesting for controlled relay and depuration; and fish and wildlife habitat. They shall be suitable for aquaculture uses, navigation, and industrial cooling. These waters shall have good aesthetic value.

Class SB1 – These waters are designated for primary and secondary contact recreational activities and fish and wildlife habitat. They shall be suitable for aquaculture uses, navigation, and industrial cooling. These waters shall have good aesthetic value. Primary contact recreational activities may be impacted due to pathogens from approved wastewater discharges. However all Class SB criteria must be met.

A partial use subcategory may also be assigned where a waterbody segment is affected by combined sewer overflows or a concentration of vessels as follows:

(a) CSO – these waters will likely be impacted by combined sewer overflows and therefore primary contact recreational activities; shellfishing uses; and fish and wildlife habitat will likely be restricted.

(b) Concentration of vessels – these waters are in the vicinity of marinas and/or mooring fields and therefore seasonal shellfishing closures will likely be required.

Shellfish Closure – Bacterial and viral pathogens are an additional source of water quality degradation in Narragansett Bay. Pathogens impair more square miles of Rhode Island coastal waters than any other major contaminant (RIDEM 2000) and lead to permanent and conditional closures of shellfish beds and swimming. Although pathogens and shellfish bed closures do not have a direct bearing on the quantity or quality of recreationally important finfish, closure areas do imply water quality degradation and perhaps contribute to an aesthetic sense of overall suitability of an area for quality fishing. Therefore a brief evaluation of shellfish closure areas is considered in this evaluation. Data on shellfish closures are taken from *Narragansett Bay Water Quality: Status and Trends 2000* (RIDEM and Narragansett Bay Estuarine Research Reserve 2000). Waters are classified as permanently closed, conditionally closed (including seasonal closures) or open to shellfishing.

Ranking – None of the water quality parameters listed above directly indicates the quality or quantity of recreationally important finfish which may be present in a given waterbody. For example, the aquatic life use support status criteria is based on macroinvertebrates, not finfish, and highly mobile finfish species may at times be found in regions classified as “not supporting aquatic life”. The other measures of water quality (i.e. impairment causes, water class, shellfish closure) may also not directly relate to the presence of recreationally important finfish. However, general assessments of water quality do provide insight into overall quality of the environment to support a rich, diverse assemblage of marine life, including recreationally important finfish. Therefore, taken together, these assessments and parameters may suggest an overall habitat quality and indirectly the potential for overall fishing quality at a site. Poor water quality may also detract from the aesthetic value of a site or public perception of quality fishing experience. Therefore, these measures of water quality are an important measure of suitability of the alternative access sites. Based on these parameters, a qualitative “general water quality ranking” was assigned to each alternative access site according to the following criteria:

Low - Waterbody does not meet aquatic life support criteria; and is permanently or conditionally closed to shellfishing..

Medium - Waterbody meets, partially meets, or is not assessed for, aquatic life support criteria; but is permanently or conditionally closed to shellfishing.

High - Waterbody meets, or is not assessed for, aquatic life support criteria, is open for shellfishing; and is classified as an SA water.

Analysis:

Analysis of the water quality data indicated a general trend of decreased water quality towards the head of the Bay. Seven of the nine alternative access sites north of Hope Island were assessed as not supporting aquatic life (Former State Pier #2, Gano Street Recreation Area, Sabin Point, Palmer River Bridge, Colt State Park, Bristol Ferry Landing, and Salter Grove) and one site (Goddard Park) as only partially supporting aquatic life. The one remaining site north of Hope Island (Bristol Narrows) was considered not assessed for aquatic life support. In contrast, all of the sites south of Hope Island were assessed as either fully supporting aquatic life (Burma Road, Rome Point, Old Jamestown Bridge, URI Bay Campus, Fort Getty, Fort Adams, Hull Cove, Brenton Point) or were considered not assessed (Stone Bridge, Allen's Harbor, Carr Point, Van Zandt Pier, Fort Wetherill, Sakonnet Point).

Suspected causes of water quality impairment for upper Bay waterbodies included excessive algal growth, pathogens, nutrient enrichment, metal contamination, and low dissolved oxygen concentrations (Table 1). Low dissolved oxygen concentration, or hypoxia, is a particularly pervasive problem in the upper reaches of Narragansett Bay and Greenwich Bay during summer months when water temperatures are warm and weather conditions leading to increased density stratification in the water column isolate bottom waters from exchange with the atmosphere. Under hypoxic conditions, marine organisms may be severely stressed or die due to lack of oxygen. While most recreationally important finfish species would likely be able to leave an area with hypoxic waters, many prey species (i.e. macroinvertebrates and smaller fish like clupeids) are less mobile and thus more susceptible to impacts from hypoxic conditions. Thus while hypoxia may not lead to death in important finfish species, it may force fish away from these waters during a hypoxic event and thus reduce the quality of the fishing experience. Furthermore, mortality of prey species during a hypoxic event may decrease the food resources of important recreational finfish for a period following the event and lead to further declines in quality fishing experience. Therefore, alternative access sites in waterbodies showing impairment due to low oxygen concentration (Former State Pier #2, Gano Street Recreation Area, Sabin Point, Palmer River Bridge, Salter Grove, Colt State Park, Bristol Ferry Landing, Goddard Park) may be less suitable for a quality fishing experience.

Table 1. Water Quality summary table for alternative access sites.
Waterbody ID indicates the water segment in the vicinity of each alternative access site. See text for explanation of remaining categories.

Alternative Access Site	Water Body ID	Aquatic Life Support	Impairment Causes [1]	Water Class	Shellfish Closure [2]	Ranking
Old Jamestown Bridge	RI00070 27E-03A	Fully	-	SA	O	High
1. Former State Pier #2	RI00070 19E-01	No	O, A, P, N	SB1(a)	P	Low
2. Gano St. Rec. Area	RI00070 19E-01	No	O, A, P, N	SB1(a)	P	Low
3. Sabin Point	RI00070 20E-01B	No	O, P, N, M	SB1(a)	P	Low
4. Palmer River Bridge	RI00070 22E-01A	No	O, P, N	SA	P	Low
5. Colt State Park	RI00070 24E-01	No	O, P, N	SA	C	Low
6. Bristol Narrows	RI00070 33E-01B	n.a.	P	SA	C	Medium
7. Bristol Ferry Landing	RI00070 32E-01B	No	O, P, N, B	SA	P	Low
8. Sakonnet Point	RI00070 31E-01B	n.a.	-	SA	O	High
9. Stone Bridge	RI00070 31E-01C	n.a.	-	SB	P	Medium
10. Carr Point	RI00070 29E-01B	Fully	-	SA	O*	High
11. Burma Road	RI00070 29E-01B	Fully	-	SA	O	High
12. Brenton Point	RI00070 29E-01A	Fully	-	SA	O	High
13. Van Zandt Pier	RI00070 30E-01K	n.a.	-	SB	P	Medium
14. Fort Adams	RI00070 29E-01A	Fully	-	SA	P	Medium
15. Fort Getty	RI00070 27E-03I	Fully	-	SA(b)	O*	High
16. Hull Cove	RI00070 29E-01A	Fully	-	SA	O	High
17. Fort Wetherill	RI00070 29E-01K	n.a.	-	SA	O	High
18. Rome Point	RI00070 27E-03A	Fully	-	SA	O*	High
19. QPD/Allen's Harbor	RI00070 27E-01A	n.a.	T	SA(b)	P	Medium
20. Salter Grove	RI00070 20E-01A	No	O, A, P, N, M	SB(a)	P	Low
21. Goddard Park	RI00070 25E-04A	Partial	O, P, N	SA	C	Medium
22. URI Bay Campus	RI00070 27E-03H	Fully	-	SB	P	Medium

[1] Impairment causes: O = low oxygen concentration; A = excessive algal growth; P = viral and bacterial pathogens; N = nutrient enrichment; M = metal contamination; B = low biodiversity; T = toxics;

[2] Shellfish closure: P = permanent closure; C = conditional closure (including seasonal); O = open. * indicates pier site is in a waterbody open for shellfishing but immediately adjacent to a closed waterbody.

Water use classifications also indicated a general trend of decreased water quality in the upper Bay and improved conditions in the lower Bay (Table 1). Alternative access sites in the Providence and Seekonk Rivers (Former State Pier #2, Gano Street Recreation Area, Sabin Point, Salter Grove) are all classified as lower quality SB(a) or SB1(a) waters with impacts associated with combined sewer overflows. Most other alternative access sites further down the Bay are generally higher quality SA waters, with the exception of several SB Class waters in specific localized areas (Stone Bridge, URI Bay Campus, Van Zandt Pier).

Nearly half of the alternative access sites are located in waterbodies which are permanently closed to shellfishing (Former State Pier #2, Gano Street Recreation Area, Sabin Point, Salter Grove, Palmer River Bridge, Van Zandt Pier, Bristol Ferry Landing, Stone Bridge, Allen's Harbor, URI Bay Campus, Fort Adams). Three sites are located in waters conditionally closed to shellfishing (Bristol Narrows, Colt State Park, Goddard Park). An additional three sites are located in waters open to shellfishing but immediately adjacent to closed waters (Carr Point, Rome Point, Fort Getty). Six sites are located in waters open to shellfishing (Burma Road, Old Jamestown Bridge, Hull Cove, Fort Wetherll, Brenton Point, Sakonnet Point).

Summary:

Given the general trend of improved water quality further down-bay, alternative access sites in the lower Bay would tend to be favored over upper Bay sites. Those sites near the mouth of the Bay (i.e. Sakonnet Point, Brenton Point, Hull Cove, Fort Wetherill) show the best water quality features with SA class waters fully supporting aquatic life and unconditionally open to shellfishing. While some of the other lower Bay sites (i.e. Fort Adams, Fort Getty, URI Bay Campus, Van Zandt Pier, Rome Point, Burma Road, Carr Point, and Allen's Harbor) display some water quality impacts such as shellfish closures or SB water classes, most are fully supporting of aquatic life and are unlikely to have significantly reduced finfish quality or quantity due to general water quality conditions. It is in the upper Bay sites, and principally those susceptible to low oxygen impacts (Goddard Park, Bristol Ferry Landing, Colt State Park, Salter Grove, Sabin Point, Gano Street Recreation Area, and Former State Pier #2) that one might expect to find significant impacts on the quantity or quality of finfish encountered, at least on a seasonal basis. Therefore this last group of sites would likely be less favorable locations for a fish access site than higher quality areas in the lower Bay.

The general water quality conditions in the vicinity of each alternative access site, and qualitative water quality ranking are briefly summarized below:

1. Former State Pier #2: Waters in the vicinity of this site do not meet aquatic life support criteria. Causes for water quality impairment include low oxygen concentration, excessive

algal growth, presence of viral and bacterial pathogens, and nutrient enrichment. These waters have been designated an SB1(a) water quality goal and are likely impacted by pathogens from approved wastewater discharges and combined sewer overflows. These waters are permanently closed to shellfishing. Based on these water quality parameters this site exhibits a LOW water quality ranking relative to that of other evaluation sites.

2. Gano St. Rec. Area: Waters in the vicinity of this site do not meet aquatic life support criteria. Causes for water quality impairment include low oxygen concentration, excessive algal growth, presence of viral and bacterial pathogens, and nutrient enrichment. These waters have been designated an SB1(a) water quality goal and are likely impacted by pathogens from approved wastewater discharges and combined sewer overflows. These waters are permanently closed to shellfishing. Based on these water quality parameters this site exhibits a LOW water quality ranking relative to that of other evaluation sites.

3. Sabin Point: Waters in the vicinity of this site do not meet aquatic life support criteria. Causes for water quality impairment include low oxygen concentration, presence of viral and bacterial pathogens, nutrient enrichment, and metals contamination. These waters have been designated an SB1(a) water quality goal and are likely impacted by pathogens from approved wastewater discharges and combined sewer overflows. These waters are permanently closed to shellfishing. Based on these water quality parameters this site exhibits a LOW water quality ranking relative to that of other evaluation sites.

4. Palmer River Bridge: Waters in the vicinity of this site do not meet aquatic life support criteria. Causes for water quality impairment include low oxygen concentration, presence of viral and bacterial pathogens, and nutrient enrichment. Due to pathogens, these waters are permanently closed to shellfishing. These waters have been designated an SA water quality goal. Based on these water quality parameters this site exhibits a LOW water quality ranking relative to that of other evaluation sites.

5. Colt State Park: Waters in the vicinity of this site do not meet aquatic life support criteria. Causes for water quality impairment include low oxygen concentration, presence of viral and bacterial pathogens, and nutrient enrichment. Due to pathogens, these waters are conditionally closed to shellfishing following heavy rains. These waters have been designated an SA water quality goal. Based on these water quality parameters this site exhibits a LOW water quality ranking relative to that of other evaluation sites.

6. Bristol Narrows: Waters in the vicinity of this site were not assessed for aquatic life support use. Causes for water quality impairment include the presence of viral and bacterial pathogens. Due to pathogens, these waters are conditionally closed to shellfishing following heavy rains. These waters have been designated an SA water quality goal. Based on these water quality parameters this site exhibits a MEDIUM water quality ranking relative to that of other evaluation sites.

7. Bristol Ferry Landing: Waters in the vicinity of this site do not meet aquatic life support criteria. Causes for water quality impairment include low oxygen concentration, presence of viral and bacterial pathogens, nutrient enrichment, and low biodiversity. Due to pathogens,

these waters are permanently closed to shellfishing. These waters have been designated an SA water quality goal. Based on these water quality parameters this site exhibits a LOW water quality ranking relative to that of other evaluation sites.

8. Sakonnet Point: Waters in the vicinity of this site were not assessed for aquatic life support use. These waters are open to shellfishing and have been designated an SA water quality goal. Based on these water quality parameters this site exhibits a HIGH water quality ranking relative to that of other evaluation sites.

9. Stone Bridge: Waters in the vicinity of this site were not assessed for aquatic life support use. These waters are permanently closed to shellfishing and have been designated an SB water quality goal. Based on these water quality parameters this site exhibits a MEDIUM water quality ranking relative to that of other evaluation sites.

10. Carr Point: Waters in the vicinity of this site were assessed as fully meeting aquatic life support criteria. These waters are open to shellfishing and have been designated an SA water quality goal. Based on these water quality parameters this site exhibits a HIGH water quality ranking relative to that of other evaluation sites.

11. Burma Road: Waters in the vicinity of this site were assessed as fully meeting aquatic life support criteria. These waters are open to shellfishing and have been designated an SA water quality goal. Based on these water quality parameters this site exhibits a HIGH water quality ranking relative to that of other evaluation sites.

12. Brenton Point: Waters in the vicinity of this site were assessed as fully meeting aquatic life support criteria. These waters are open to shellfishing and have been designated an SA water quality goal. Based on these water quality parameters this site exhibits a HIGH water quality ranking relative to that of other evaluation sites.

13. Van Zandt Pier: Waters in the vicinity of this site were not assessed for aquatic life support use. These waters are permanently closed to shellfishing and have been designated an SB water quality goal. Based on these water quality parameters this site exhibits a MEDIUM water quality ranking relative to that of other evaluation sites.

14. Fort Adams: Waters in the vicinity of this site were assessed as fully meeting aquatic life support criteria. These waters are permanently closed to shellfishing and have been designated an SA water quality goal. Based on these water quality parameters this site exhibits a MEDIUM water quality ranking relative to that of other evaluation sites.

15. Fort Getty: Waters in the vicinity of this site were assessed as fully meeting aquatic life support criteria. These waters are open to shellfishing and have been designated an SA(b) water quality goal due to the close proximity of a seasonal mooring field. Based on these water quality parameters this site exhibits a HIGH water quality ranking relative to that of other evaluation sites.

16. Hull Cove: Waters in the vicinity of this site were assessed as fully meeting aquatic life support criteria. These waters are open to shellfishing and have been designated an SA water quality goal. Based on these water quality parameters this site exhibits a HIGH water quality ranking relative to that of other evaluation sites.

17. Fort Wetherill: Waters in the vicinity of this site were not assessed for aquatic life support use. These waters are open to shellfishing and have been designated an SA water quality goal. Based on these water quality parameters this site exhibits a HIGH water quality ranking relative to that of other evaluation sites.

18. Rome Point: Waters in the vicinity of this site were assessed as fully meeting aquatic life support criteria. These waters are open to shellfishing and have been designated an SA water quality goal. Based on these water quality parameters this site exhibits a HIGH water quality ranking relative to that of other evaluation sites.

19. QPD/Allen's Harbor: Waters in the vicinity of this site were not assessed for aquatic life support use. These waters are impaired by total toxics and are permanently closed to shellfishing by policy due to the proximity of a hazardous waste site and landfill. These waters have been designated an SA(b) water quality goal. Based on these water quality parameters this site exhibits a MEDIUM water quality ranking relative to that of other evaluation sites.

20. Salter Grove: Waters in the vicinity of this site do not meet aquatic life support criteria. Causes for water quality impairment include low oxygen concentration, excessive algal growth, presence of viral and bacterial pathogens, nutrient enrichment, and metals contamination. These waters have been designated an SB(a) water quality goal and are likely impacted by pathogens from combined sewer overflows. These waters are permanently closed to shellfishing. Based on these water quality parameters this site exhibits a LOW water quality ranking relative to that of other evaluation sites.

21. Goddard Park: Waters in the vicinity of this site partially meet aquatic life support criteria. Causes for water quality impairment include low oxygen concentration, presence of viral and bacterial pathogens, and nutrient enrichment. Due to pathogens, these waters are conditionally closed to shellfishing following heavy rains. These waters have been designated an SA water quality goal. Based on these water quality parameters this site exhibits a MEDIUM water quality ranking relative to that of other evaluation sites.

22. URI Bay Campus: Waters in the vicinity of this site were assessed as fully meeting aquatic life support criteria. These waters are permanently closed to shellfishing and have been designated an SB water quality goal. Based on these water quality parameters this site exhibits a MEDIUM water quality ranking relative to that of other evaluation sites.

Old Jamestown Bridge Site: Waters in the vicinity of this site were assessed as fully meeting aquatic life support criteria. These waters are open to shellfishing and have been designated an SA water quality goal. Based on these water quality parameters this site exhibits a HIGH water quality ranking relative to that of other evaluation sites.